CCD NEW TECHNICAL THEORY FOR SERVICING

CCD-TR400/TR750/ TR650E/TR750E

SERVICE TECHNICAL MANUAL

Photo : CCD-TR650E

Hi8 VIDEO CAMERA RECORDER

SONY®

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CCD-TR400/TR750/ TR650E/TR750E

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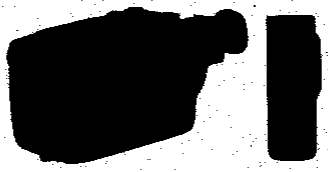

Photo : CCD-TR650E

Hi8 VIDEO CAMERA RECORDER

SONY

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1. Outline

1-1. Connection for waveform/voltage check

When checking waveforms and voltages, various methods can be used for connection. Here, a simple method is used which is shown in the "SERVICE MANUAL".

Connection for checking camera system

- Connection of VC board CN775 is not required for checking circuits other than hand-deflection compensation circuit or for locking the operation of hand-deflection compensation. The VC board can be checked easily by removing CN775.

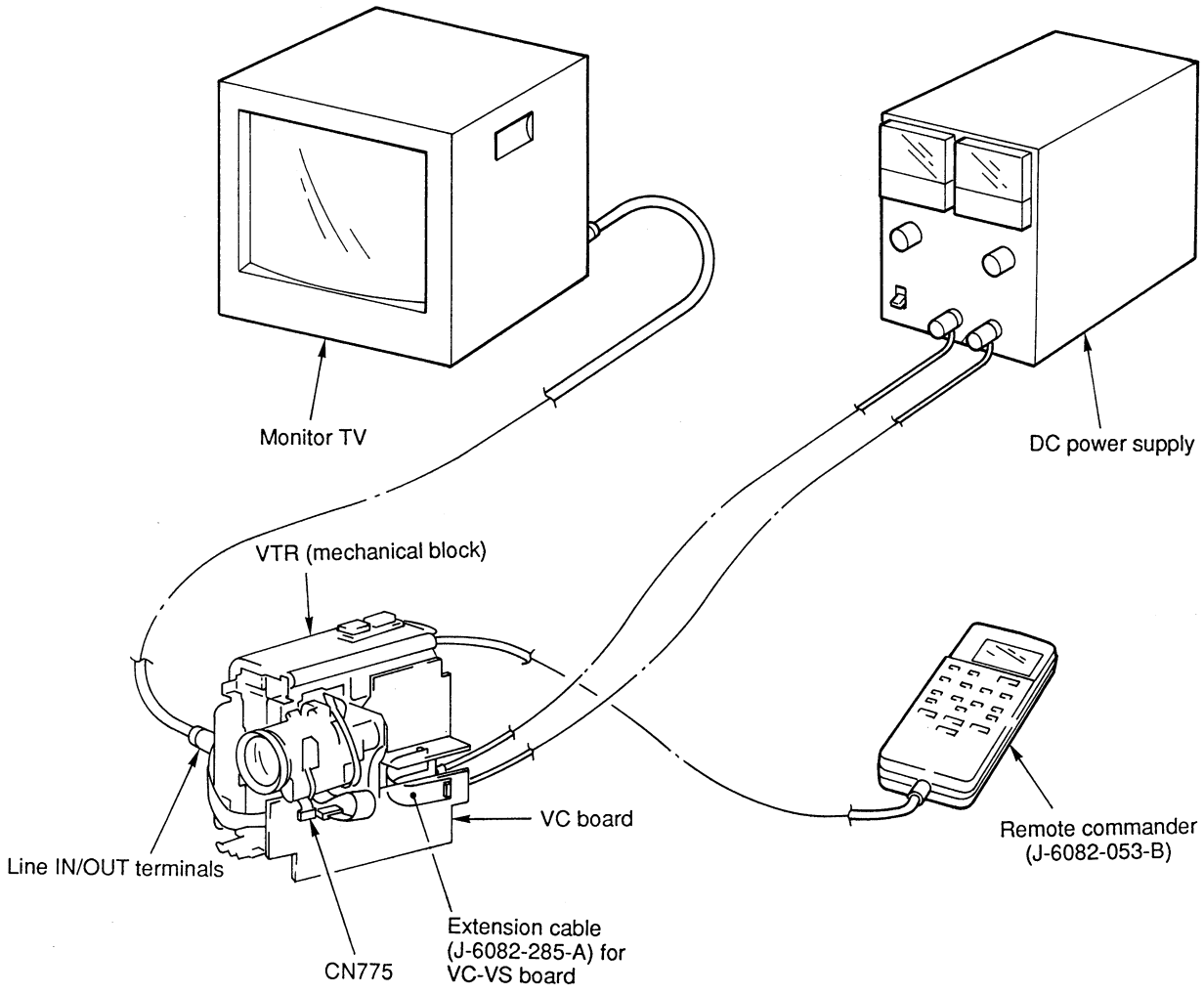


Fig. 1-1

1. Outline

1-1. Connection for waveform/voltage check

When checking waveforms and voltages, various methods can be used for connection. Here, a simple method is used which is shown in the "SERVICE MANUAL".

Connection for checking camera system

- Connection of VC board CN775 is not required for checking circuits other than hand-deflection compensation circuit or for locking the operation of hand-deflection compensation. The VC board can be checked easily by removing CN775.

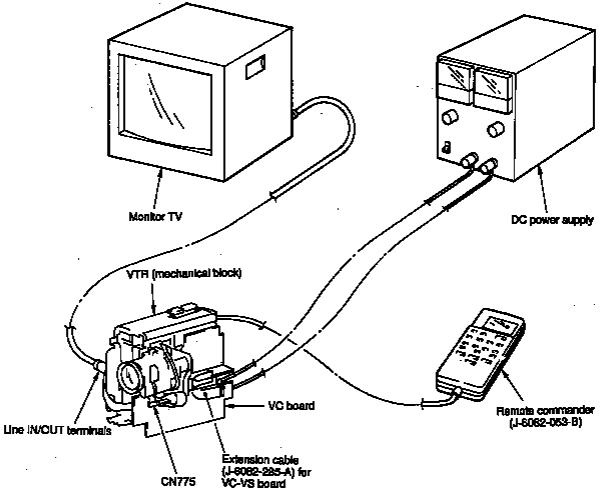


Fig. 1-1

Connection for video servo/system control circuit check

- Remove the lens block and VC board when camera video signal and character generator signal are not required.
- When the EJECT switch is not used, the VS board CN502 need not be connected. To open the VS board, remove CN502 and line IN/OUT terminals.

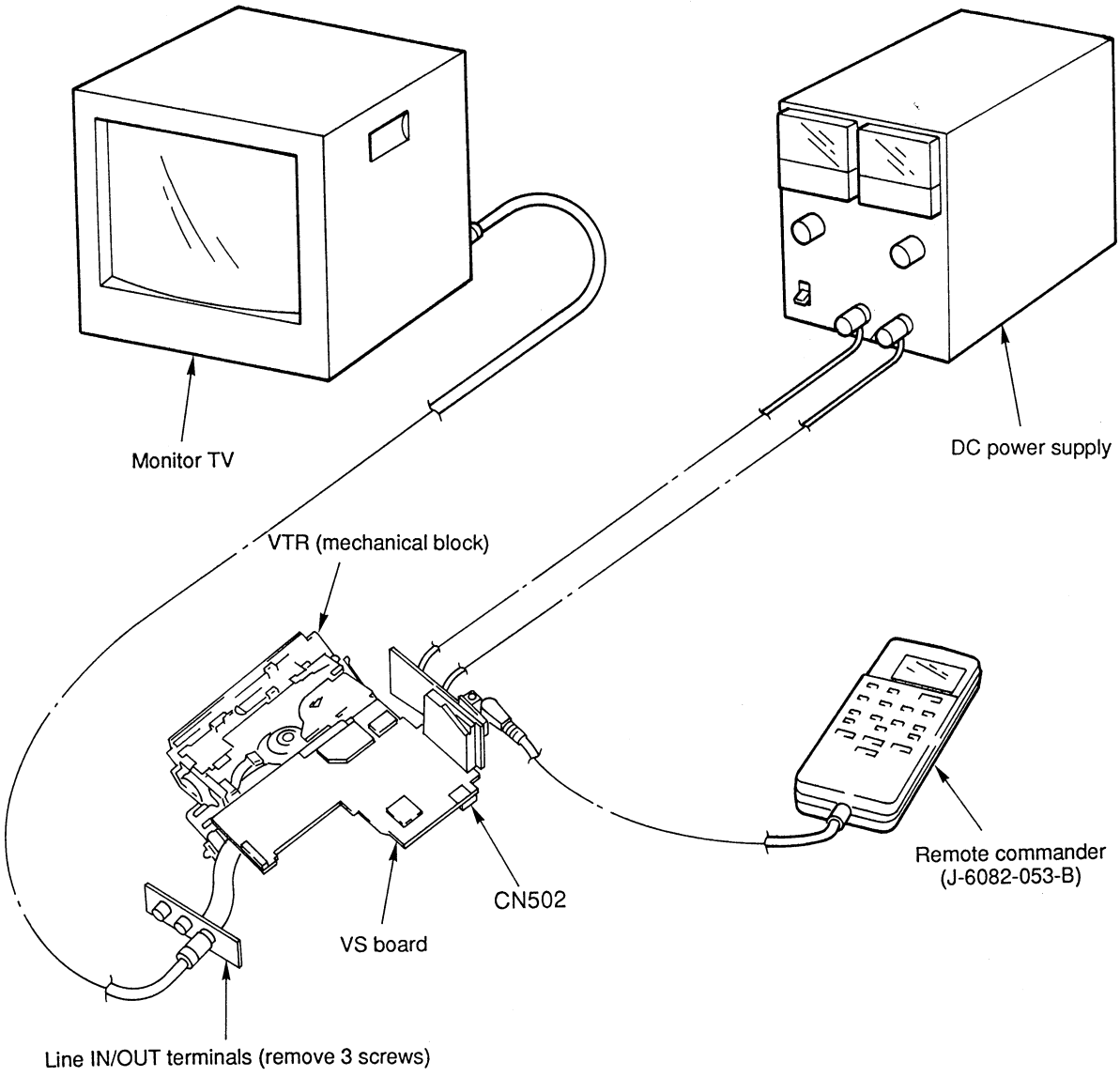


Fig. 1-2

Connection for video servo/system control circuit check

- Remove the lens block and VC board when camera video signal and character generator signal are not required.
- When the EJECT switch is not used, the VS board CN502 need not be connected. To open the VS board, remove CN502 and line IN/OUT terminals.

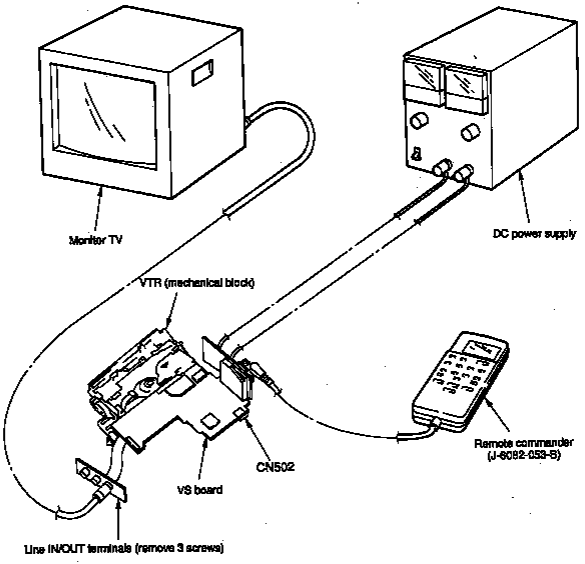


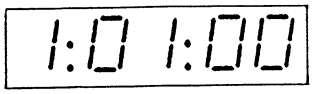
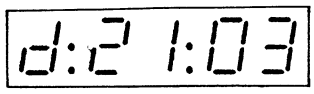
Fig. 1-2

1-2. Setting of CAMERA/VTR mode with adjusting remote commander

- When the cabinet (R) with camera, VTR power switch has been removed, use the following procedure for setting of camera, VTR mode.
- After connecting the adjusting remote commander, set NORMAL/HOLD switch in HOLD position and supply the power from the battery terminal.

Setting of camera mode

Indication on remote commander

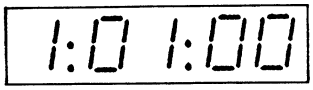
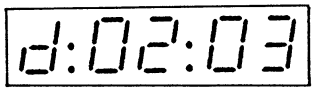
1) Set the Data: 01 to Page: 1 and Address: 00 (D page protect is released). ⇒ 
2) Set the Data: 21 to Page: D and Address: 03 (Setting of camera power ON mode). ⇒ 
3) Press the pause button (memory write).
4) Set the NORMAL/HOLD switch in NORMAL position.

⇩

The remote commander is ready for operation.

Setting of VTR mode

Indication on remote commander

1) Set the Data: 01 to Page: 1 and Address:00 (D page protect is released). ⇒ 
2) Set the Data: 02 to Page: D and Address:03 (Setting of VTR power ON mode) ⇒ 
3) Press the pause button (memory write).
4) Set the NORMAL/HOLD switch in NORMAL position.

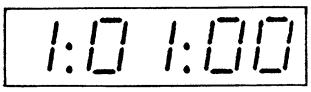
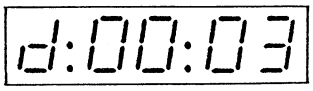
⇩

The remote commander is ready for operation.

Release of camera/VTR power ON mode

At the completion of repair or adjustment, be sure to release camera/VTR power ON mode (or else, the power switch cannot be used).

Indication on remote commander

1) Check that Page: 1 and Address: 00 are Data: 01. ⇒ 
   - **Page:1 and Address: 00 become Data: 00 at power OFF.**
2) Set the Page: D and Address: 03 back to Data: 00 (camera/VTR power ON mode is released). ⇒ 
3) Press the pause button (memory write).
4) Set the NORMAL/HOLD switch in NORMAL position.

⇩

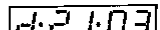
Power OFF

1-2. Setting of CAMERA/VTR mode with adjusting remote commander

- When the cabinet (R) with camera, VTR power switch has been removed, use the following procedure for setting of camera, VTR mode.
- After connecting the adjusting remote commander, set NORMAL/HOLD switch in HOLD position and supply the power from the battery terminal.

Setting of camera mode

Indication on remote commander

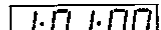
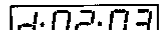
1) Set the Data: 01 to Page: 1 and Address: 00 (D page protect is released). ⇒
2) Set the Data: 21 to Page: D and Address: 03 (Setting of camera power ON mode). ⇒ 
3) Press the pause button (memory write).
4) Set the NORMAL/HOLD switch in NORMAL position.

⇩

The remote commander is ready for operation.

Setting of VTR mode

Indication on remote commander

1) Set the Data: 01 to Page: 1 and Address:00 (D page protect is released). ⇒ 
2) Set the Data: 02 to Page: D and Address:03 (Setting of VTR power ON mode) ⇒ 
3) Press the pause button (memory write).
4) Set the NORMAL/HOLD switch in NORMAL position.

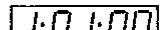
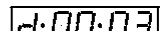
⇩

The remote commander is ready for operation.

Release of camera/VTR power ON mode

At the completion of repair or adjustment, be sure to release camera/VTR power ON mode (or else, the power switch cannot be used).

Indication on remote commander

1) Check that Page: 1 and Address: 00 are Data: 01. ⇒ 
   - **Page:1 and Address: 00 become Data: 00 at power OFF.**
2) Set the Page: D and Address: 03 back to Data: 00 (camera/VTR power ON mode is released). ⇒ 
3) Press the pause button (memory write).
4) Set the NORMAL/HOLD switch in NORMAL position.

⇩

Power OFF

1-3. Setting in REC mode of model without REC switch

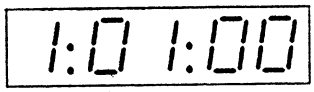
Except CCD-TR750E (E, Australian model)

Model without REC switch cannot accept REC command of remote commander (LANC, Infrared ray). When it becomes necessary to set in VTR REC mode for checking the recording system of external signal input, cancel the REC key forbidden accept mode using the following procedure.

- When the cabinet (R) has been removed, set in VTR mode as explained before and perform the following operation.

REC key forbidden accept mode cancel

Indication on remote commander

1) Set Data: 01 to Page: 1 and Address: 00. ⇨ 
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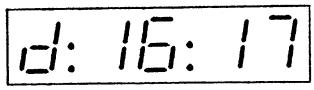
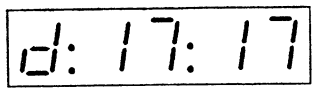
2) Set Data: 16 [17] to Page: D and Address: 17. ⇨ 
   (REC key forbidden accept mode cancel)

or



3) Press pause button (memory write).
4) Set NORMAL/HOLD switch in NORMAL position.

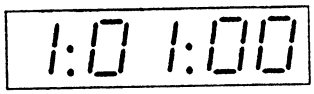
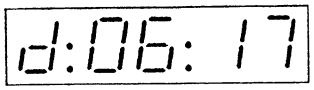
⇩

REC mode is set by pressing REC switch.

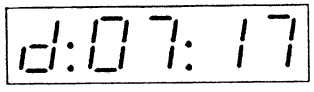
REC key forbidden accept mode setting

Indication on remote commander

At the completion of repair or adjustment, be sure to set in REC key forbidden accept mode.
(If this is not done, REC command is accepted.)

1) Check that Page: 1 and Address: 00 are Data: 01. ⇨ 
   • Page: 1 and Address: 00 are set in Data: 00 at power OFF.
2) Set Data: 06 [07] to Page: D and Address: 17. ⇨ 
   (REC key forbidden accept mode setting)

or



3) Press pause button (memory write).
4) Set NORMAL/HOLD switch in NORMAL position and check that REC command is not accepted.

Note: Data in [ ] are for E, Australian, Tourist model, except for CCD-TR750E, while other data are for AEP, UK model.

1-3. Setting in REC mode of model without REC switch

Except CCD-TR750E (E, Australian model)

Model without REC switch cannot accept REC command of remote commander (LANC, Infrared ray). When it becomes necessary to set in VTR REC mode for checking the recording system of external signal input, cancel the REC key forbidden accept mode using the following procedure.

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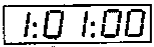
REC key forbidden accept mode cancel

Indication on remote commander

1) Set Data: 01 to Page: 1 and Address: 00. ⇒ 
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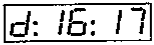
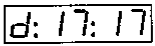
2) Set Data: 16 [17] to Page: D and Address: 17. ⇒ 
   (REC key forbidden accept mode cancel)
   or
   
3) Press pause button (memory write).
4) Set NORMAL/HOLD switch in NORMAL position.

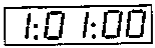
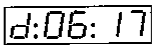
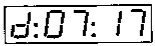
⇩

REC mode is set by pressing REC switch.

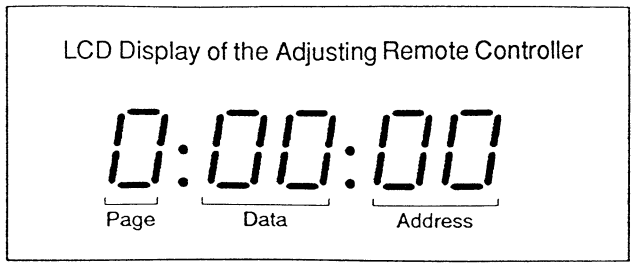
REC key forbidden accept mode setting

Indication on remote commander

At the completion of repair or adjustment, be sure to set in REC key forbidden accept mode.
(If this is not done, REC command is accepted.)

1) Check that Page: 1 and Address: 00 are Data: 01. ⇒ 
   - **Page: 1 and Address: 00 are set in Data: 00 at power OFF.**
2) Set Data: 06 [07] to Page: D and Address: 17. ⇒ 
   (REC key forbidden accept mode setting)
   or
   
3) Press pause button (memory write).
4) Set NORMAL/HOLD switch in NORMAL position and check that REC command is not accepted.

Note: Data in [ ] are for E, Australian, Tourist model, except for CCD-TR750E, while other data are for AEP, UK model.



Adjusting remote commander RM-95 (J-6082-053-B)

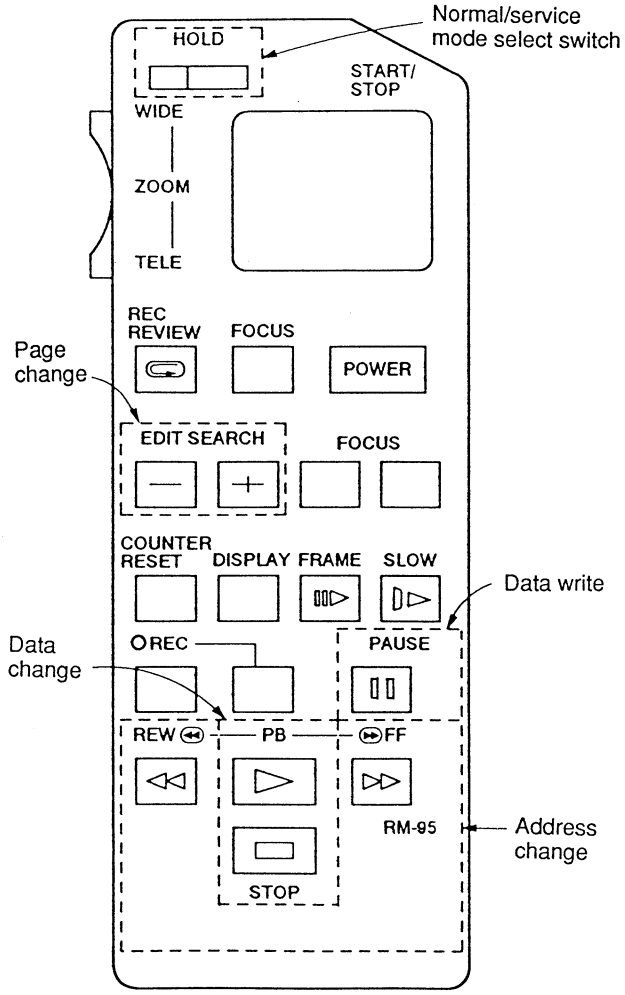
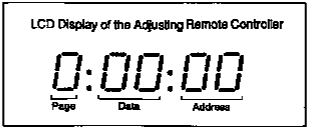


Fig. 1-3 Adjusting remote commander



Adjusting remote commander RM-95 (J-6082-053-B)

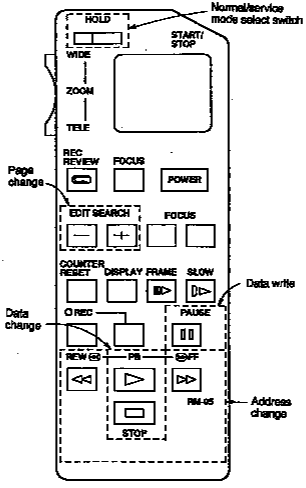


Fig. 1-3 Adjusting remote commander

MEMO

MEMO

2. Camera circuit

Waveforms and voltages in this Chapter have been measured under the following conditions.

- Basically, color bar chart was obtained by using PTB-450. "All white" means that the color bar chart was removed from the pattern box, while "Black mask" means that a black object was cover on the front of the lens.

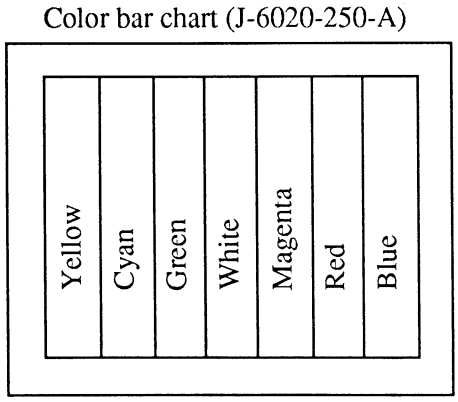


Fig. 2-1

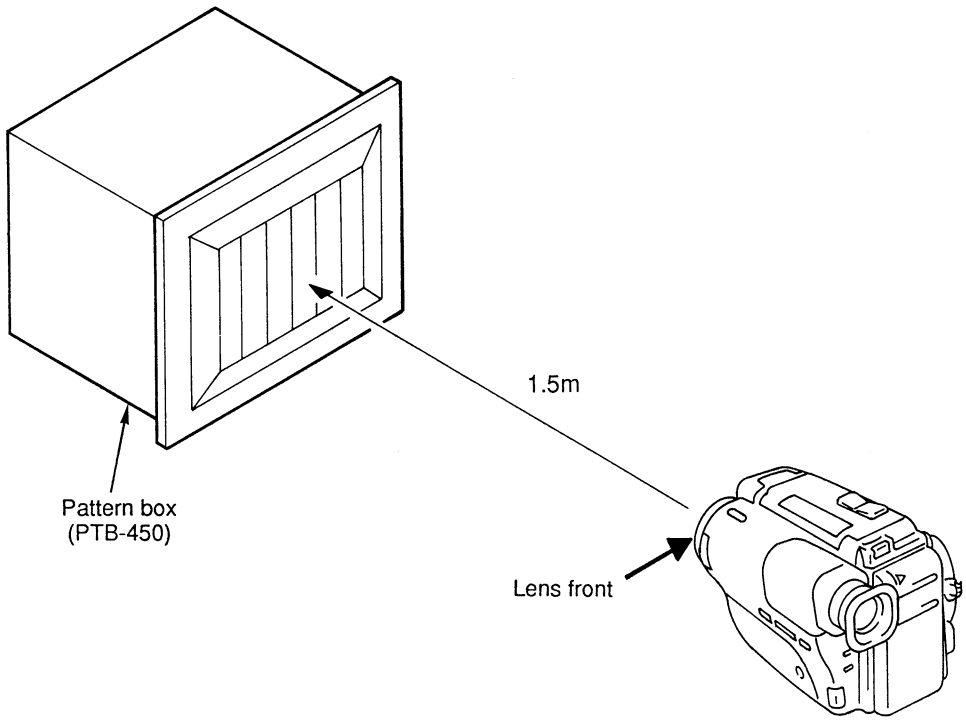


Fig. 2-2

- Auto-focus and STEADY SHOT are OFF.

2. Camera circuit

Waveforms and voltages in this Chapter have been measured under the following conditions.

- Basically, color bar chart was obtained by using PTB-450. "All white" means that the color bar chart was removed from the pattern box, while "Black mask" means that a black object was cover on the front of the lens.

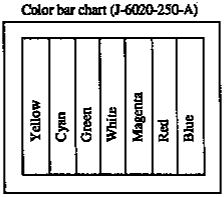


Fig. 2-1

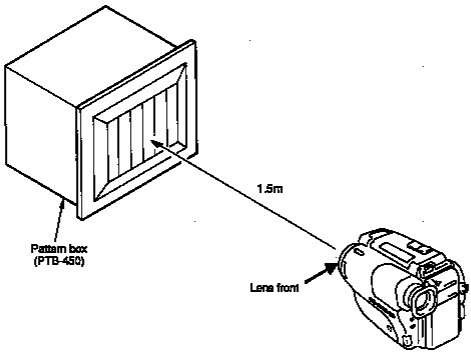


Fig. 2-2

- Auto-focus and STEADY SHOT are OFF.

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3. Video circuit

Waveforms and voltages shown in this chapter have been measured under the following conditions after the camera system (VC board) was removed, except when measuring the character generator input pulse.

- **Recording system**

Unless otherwise specified in the figure, the composite video signal from the pattern generator has been inputted to the video IN/OUT terminal. Waveforms and voltages outputted from S-video terminal and camera are also shown.

[Input signals]

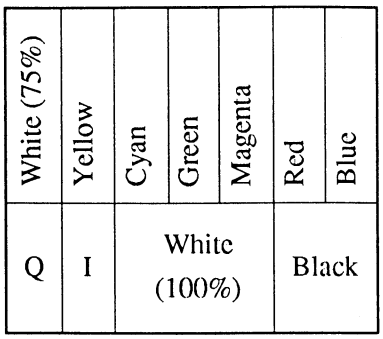

Fig. 3-1 Input signals

- **Playback system**

Fig. 3-1 shows the state of playback of tape recorded with color bar signal in the standard mode.

[Expression of each mode]

STD mode : Standard mode (conventional type of 8mm video, excluding Hi8)
SREC : Recording mode for signal inputted from S-video terminal
COMP REC : Recording mode for composite video signal

3. Video circuit

Waveforms and voltages shown in this chapter have been measured under the following conditions after the camera system (VC board) was removed, except when measuring the character generator input pulse.

- **Recording system**

Unless otherwise specified in the figure, the composite video signal from the pattern generator has been inputted to the video IN/OUT terminal. Waveforms and voltages outputted from S-video terminal and camera are also shown.

[Input signals]

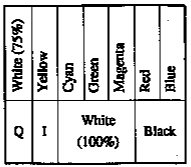

Fig. 3-1 Input signals

- **Playback system**

Fig. 3-1 shows the state of playback of tape recorded with color bar signal in the standard mode.

[Expression of each mode]

STD mode : Standard mode (conventional type of 8mm video, excluding Hi8)
SREC : Recording mode for signal inputted from S-video terminal
COMP REC : Recording mode for composite video signal

[HE board (REC Y RF system) signal flow]

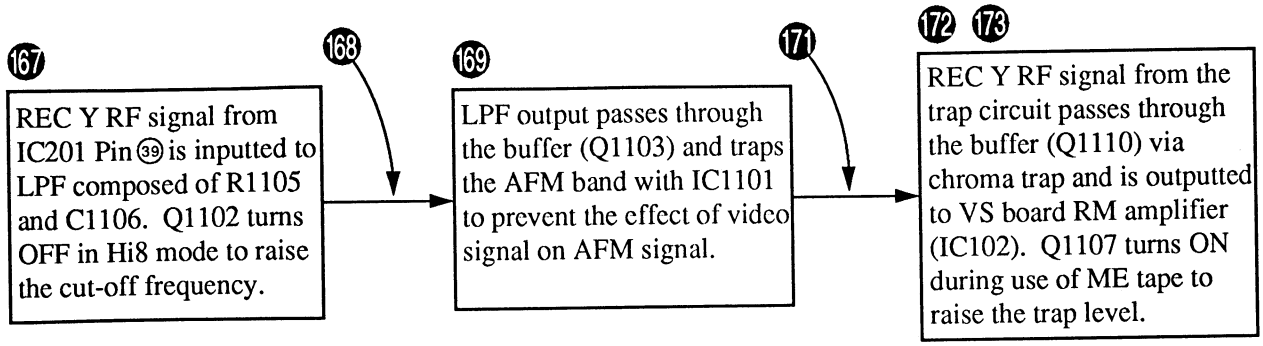
167
REC Y RF signal from IC201 Pin ㊴ is inputted to LPF composed of R1105 and C1106. Q1102 turns OFF in Hi8 mode to raise the cut-off frequency.
168
169
LPF output passes through the buffer (Q1103) and traps the AFM band with IC1101 to prevent the effect of video signal on AFM signal.
171
172 173
REC Y RF signal from the trap circuit passes through the buffer (Q1110) via chroma trap and is outputted to VS board RM amplifier (IC102). Q1107 turns ON during use of ME tape to raise the trap level.

Fig. 3-10

[HE board (REC Y RF system) signal flow]

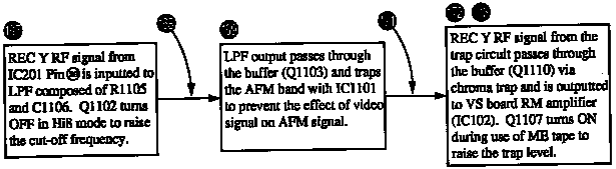
REC Y RF signal from IC201 Pin is inputted to LPF composed of R1105 and C1106. Q1102 turns OFF in Hi8 mode to raise the cut-off frequency.
LPF output passes through the buffer (Q1103) and traps the AFM band with IC1101 to prevent the effect of video signal on AFM signal.
REC Y RF signal from the trap circuit passes through the buffer (Q1110) via chroma trap and is outputted to VS board RM amplifier (IC102). Q1107 turns ON during use of MB tape to raise the trap level.

Fig. 3-10

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[HE board (PB Y EQ) signal flow]

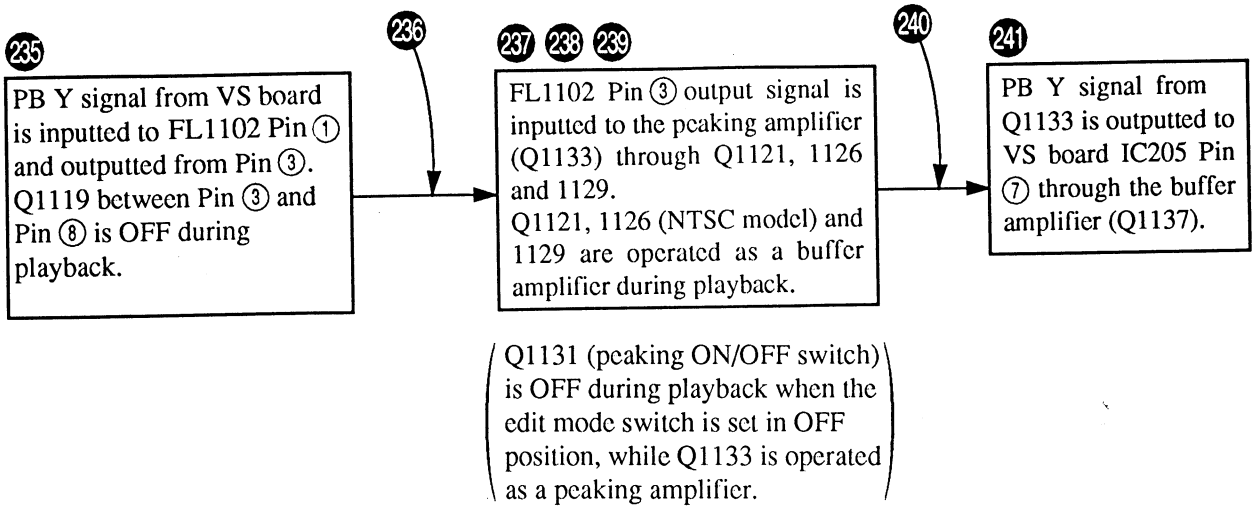
235
PB Y signal from VS board is inputted to FL1102 Pin ① and outputted from Pin ③. Q1119 between Pin ③ and Pin ⑧ is OFF during playback.
236
237 238 239
FL1102 Pin ③ output signal is inputted to the peaking amplifier (Q1133) through Q1121, 1126 and 1129.
Q1121, 1126 (NTSC model) and 1129 are operated as a buffer amplifier during playback.
240
241
PB Y signal from Q1133 is outputted to VS board IC205 Pin ⑦ through the buffer amplifier (Q1137).
Q1131 (peaking ON/OFF switch) is OFF during playback when the edit mode switch is set in OFF position, while Q1133 is operated as a peaking amplifier.

Fig. 3-21

[HE board (PB Y EQ) signal flow]

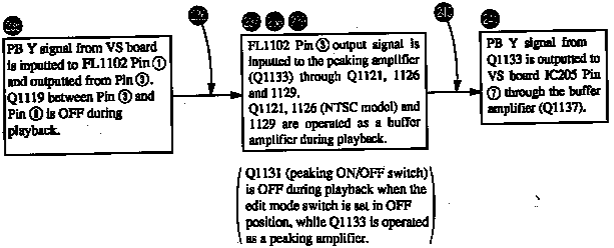
PB Y signal from VS board is inputted to FL1102 Pin ① and outputted from Pin ③. Q1119 between Pin ③ and Pin ⑧ is OFF during playback.
FL1102 Pin ③ output signal is inputted to the peaking amplifier (Q1133) through Q1121, 1126 and 1129.
Q1121, 1126 (NTSC model) and 1129 are operated as a buffer amplifier during playback.
Q1131 (peaking ON/OFF switch) is OFF during playback when the edit mode switch is set in OFF position, while Q1133 is operated as a peaking amplifier.
PB Y signal from Q1133 is outputted to VS board IC205 Pin ⑦ through the buffer amplifier (Q1137).

Fig. 3-21

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4-3. Loading/unloading flow chart

Loading/unloading operation with/without cassette tape is explained in the following.

If VTR is not operating as shown in the flow chart, it means that loading/unloading operation is not performed correctly.

In the event of **"EMERGENCY"** during loading/unloading or while tape is running, be sure to check the emergency code and emergency mode.

Note: After repair, reset the address data with emergency code and emergency mode stored in memory to 00, then press the pause button of the adjusting remote commander.

[Address with emergency code stored in memory]

Page D: Address: EC .....1st emergency

Address: E8 .....2nd emergency

Address: E4 .....Last emergency ⟹ Re-written on by one for the last emergency.

[Emergency code]

Code	Error Condition
00	No error
01	Loading motor error
02	Reel error during unloading
03	Reel errors at other times
04	Capstan error
05	FG error during drum start up
06	PG error during drum start up
07	FG error during normal drum conditions
08	PG error during normal drum conditions
09	Phase error during normal drum conditions

4-3. Loading/unloading flow chart

Loading/unloading operation with/without cassette tape is explained in the following.

If VTR is not operating as shown in the flow chart, it means that loading/unloading operation is not performed correctly.

In the event of "EMERGENCY" during loading/unloading or while tape is running, be sure to check the emergency code and emergency mode.

Note: After repair, reset the address data with emergency code and emergency mode stored in memory to 00, then press the pause button of the adjusting remote commander.

[Address with emergency code stored in memory]

Page D: Address: EC .....1st emergency
Address: E8 .....2nd emergency
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[Emergency code]

Code	Error Condition
00	No error
01	Loading motor error
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04	Capstan error
05	PG error during drum start up
06	PG error during drum start up
07	PG error during normal drum conditions
08	PG error during normal drum conditions
09	Phase error during normal drum conditions

[Address with emergency mode stored in memory]

Page D: Address: ED ..... 1st emergency
Address: E9 ..... 2nd emergency
Address: E5 ..... Last emergency ⟹ Re-written on by one for the last emergency.

[Emergency code]

Code	Error Condition
00	BEFOR INITIALIZE
01	EJECTED
02	NORMAL STOP
03	FF
04	NORMAL REC
06	NORMAL PB
07	PB PAUSE
12	LOADING
14	REC PAUSE
26	×1
27	1/5 SLOW
31	UNLOADING
46	CUE
56	REVIEW
62	STOP TAPE END
66	×2
67	FRAME
72	STOP TAPE TOP
83	REWIND
85	REC REVIEW (+)
95	REC REVIEW (−)
97	−PB PAUSE
A2	EMERGENCY LOADING
A5	EDIT SEARCH (+)
B1	EMERGENCY UNLOADING
B2	STOP EMERGENCY 1
B5	EDIT SEARCH (−)
C2	STOP EMERGENCY 2
E2	STOP NO CASSETTE
F5	EDIT PAUSE

[Address with emergency mode stored in memory]

Page D: Address: ED ..... 1st emergency
Address: E9 ..... 2nd emergency
Address: E5 ..... Last emergency ⟹ Re-written on by one for the last emergency.

[Emergency code]

Code	Error Condition
00	BEFOR INITIALIZE
01	EJECTED
02	NORMAL STOP
03	FF
04	NORMAL REC
06	NORMAL PB
07	PB PAUSE
12	LOADING
14	REC PAUSE
26	×1
27	1/5 SLOW
31	UNLOADING
46	CUE
56	REVIEW
62	STOP TAPE END
66	×2
67	FRAME
72	STOP TAPE TOP
83	REWIND
85	REC REVIEW (+)
95	REC REVIEW (−)
97	−PB PAUSE
A2	EMERGENCY LOADING
A5	EDIT SEARCH (+)
B1	EMERGENCY UNLOADING
B2	STOP EMERGENCY 1
B5	EDIT SEARCH (−)
C2	STOP EMERGENCY 2
E2	STOP NO CASSETTE
F5	EDIT PAUSE

[Detection of "with/without cassette"]

During loading/unloading operation, "with/without cassette tape" is detected by the tape top/end sensor. It is detected at ON of CC DOWN SWITCH (Cassette compartment down switch).

(1) Detection of the light of TAPE LED by both tape top/end sensors ..... "Without tape" is detected. Loading/unloading operation is effected when drum/capstan motor is not rotated.

(2) Detection of the light of TAPE LED by tape top sensor alone or no detection by both tape top/end sensor ..... "With tape" is detected. Loading/unloading operation is effected when drum/capstan motor is rotated to remove tape slack.

(3) Detection of the light of TAPE LED by tape end sensor alone ..... Tape which has been sent to tape end is detected when it is inserted.

[Detection of insertion of tape which has been sent to tape end]

The mechanism deck of this model is designed for loading with tape pulled out from S reel and for unloading with tape wound on S reel. T reel is given a hard brake and when tape is sent to the tape end and no tape is wound on S reel, loading operation is not effected.

In this case shift the mode to the end (END mode) of EJECT mode to release the hard brake on T reel for cassette compartment lock standby mode.

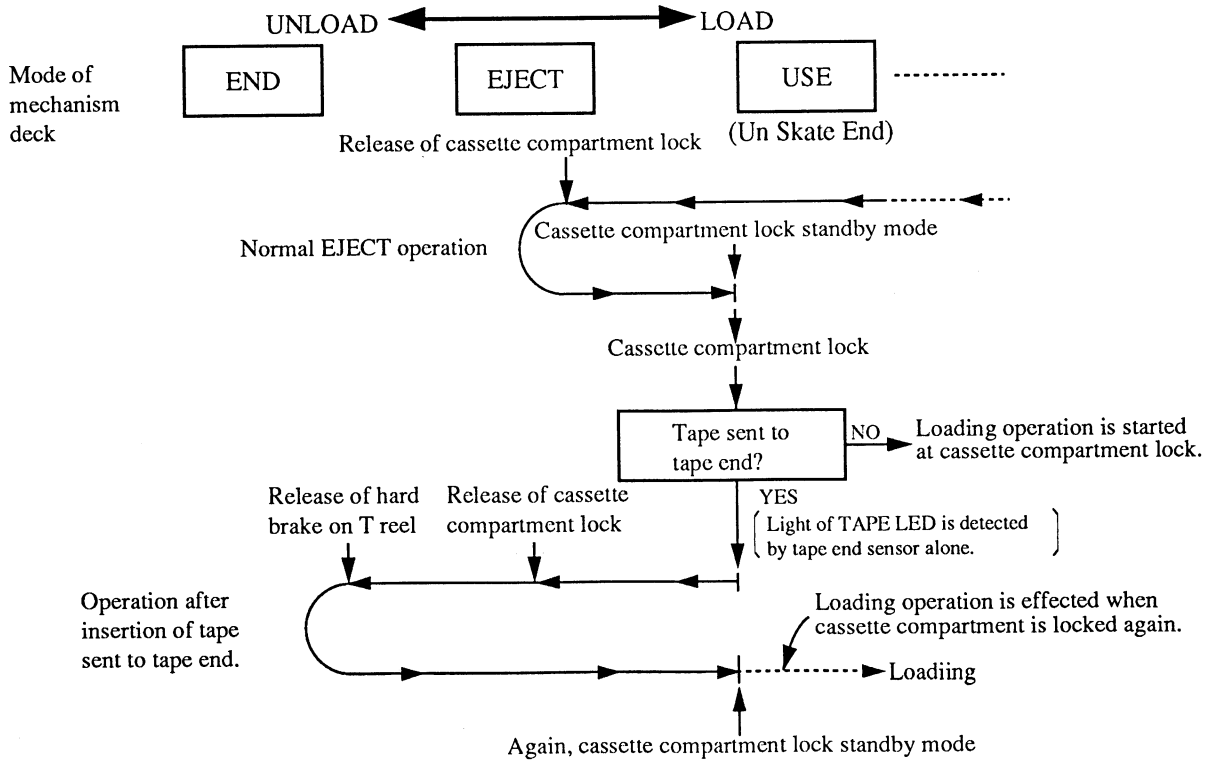
UNLOAD
LOAD
Mode of mechanism deck
END
EJECT
USE
(Un Skate End)
Release of cassette compartment lock
Normal EJECT operation
Cassette compartment lock standby mode
Cassette compartment lock
Tape sent to tape end?
NO
Loading operation is started at cassette compartment lock.
YES
Release of hard brake on T reel
Release of cassette compartment lock
Light of TAPE LED is detected by tape end sensor alone.
Operation after insertion of tape sent to tape end.
Loading operation is effected when cassette compartment is locked again.
Loadiing
Again, cassette compartment lock standby mode

Fig. 4-8

[Detection of "with/without cassette"]

During loading/unloading operation, "with/without cassette tape" is detected by the tape top/end sensor. It is detected at ON of CC DOWN SWITCH (Cassette compartment down switch).

(1) Detection of the light of TAPE LED by both tape top/end sensors ..... "Without tape" is detected. Loading/unloading operation is effected when drum/capstan motor is not rotated.

(2) Detection of the light of TAPE LED by tape top sensor alone or no detection by both tape top/end sensor ..... "With tape" is detected. Loading/unloading operation is effected when drum/capstan motor is rotated to remove tape slack.

(3) Detection of the light of TAPE LED by tape end sensor alone ..... Tape which has been sent to tape end is detected when it is inserted.

[Detection of insertion of tape which has been sent to tape end]

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In this case shift the mode to the end (END mode) of EJECT mode to release the hard brake on T reel for cassette compartment lock standby mode.

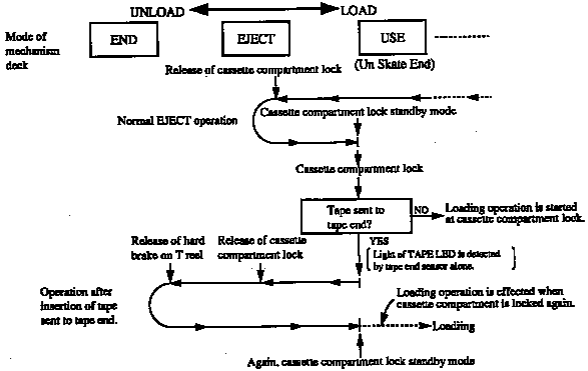
UNLOAD
LOAD
Mode of mechanism deck
END
EJECT
USE
(Un Skate End)
Release of cassette compartment lock
Normal EJECT operation
Cassette compartment lock standby mode
Cassette compartment lock
Tape sent to tape end?
NO
Loading operation is started at cassette compartment lock.
YES
Light of TAPE LED is detected by tape end sensor alone.
Release of hard brake on T reel
Release of cassette compartment lock
Operation after insertion of tape sent to tape end.
Loading operation is effected when cassette compartment is locked again.
Loading
Again, cassette compartment lock standby mode

Fig. 4-8

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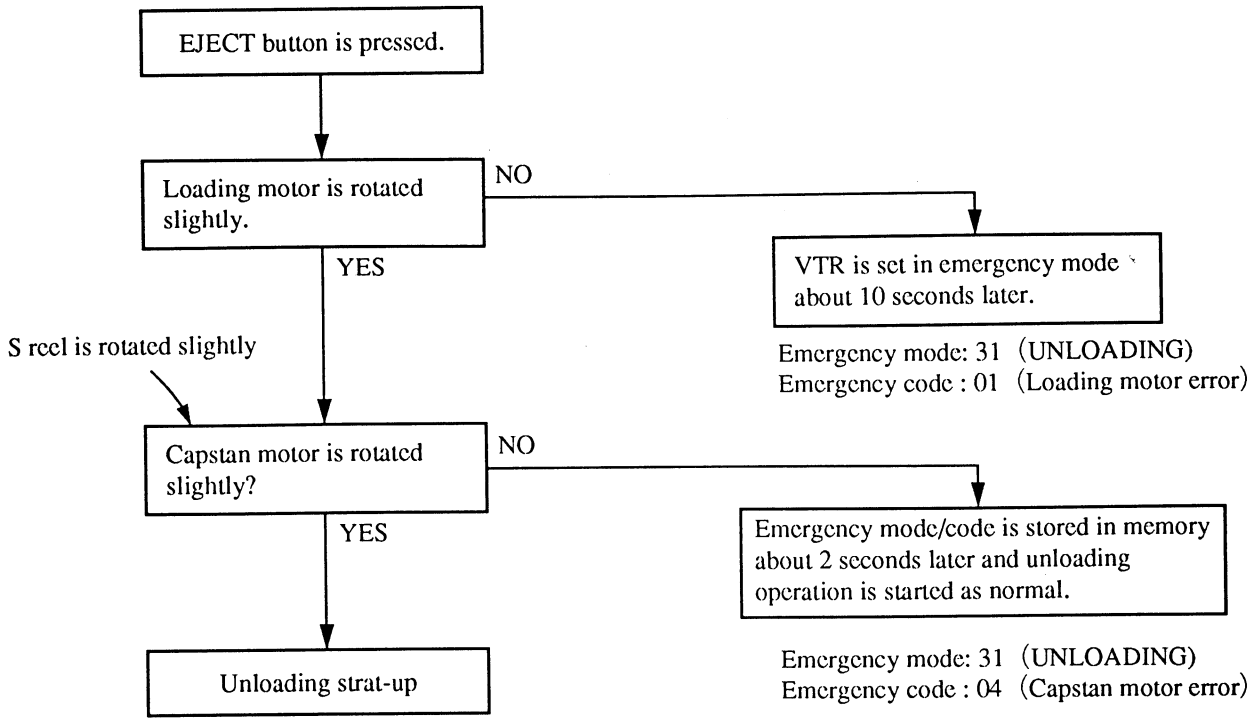
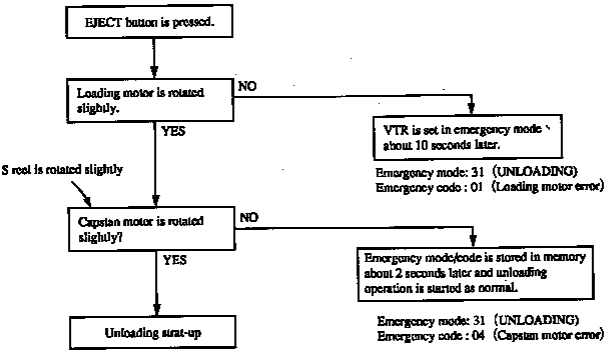
• UNLOADING (without cassette tape)

- When the light of TAPE LED is intercepted and the power switch is turned OFF→ON once (or after LOADING with the light of TAPE LED intercepted in EJECT mode), VTR operates in the same mode as UNLOADING with cassette tape by pressing the EJECT button.


EJECT button is pressed.
Loading motor is rotated slightly.
NO
YES
VTR is set in emergency mode about 10 seconds later.
Emergency mode: 31 (UNLOADING)
Emergency code : 01 (Loading motor error)
S reel is rotated slightly
Capstan motor is rotated slightly?
NO
YES
Emergency mode/code is stored in memory about 2 seconds later and unloading operation is started as normal.
Emergency mode: 31 (UNLOADING)
Emergency code : 04 (Capstan motor error)
Unloading strat-up

• UNLOADING (without cassette tape)

• When the light of TAPE LED is intercepted and the power switch is turned OFF→ON once (or after LOADING with the light of TAPE LED intercepted in EJECT mode), VTR operates in the same mode as UNLOADING with cassette tape by pressing the EJECT button.


EJECT button is pressed.
Loading motor is rotated slightly.
NO
YES
VTR is set in emergency mode about 10 seconds later.
Emergency mode: 31 (UNLOADING)
Emergency code : 01 (Loading motor error)
S reel is rotated slightly
Capstan motor is rotated slightly?
NO
YES
Emergency mode/code is stored in memory about 2 seconds later and unloading operation is started as normal.
Unloading strat-up
Emergency mode: 31 (UNLOADING)
Emergency code : 04 (Capstan motor error)

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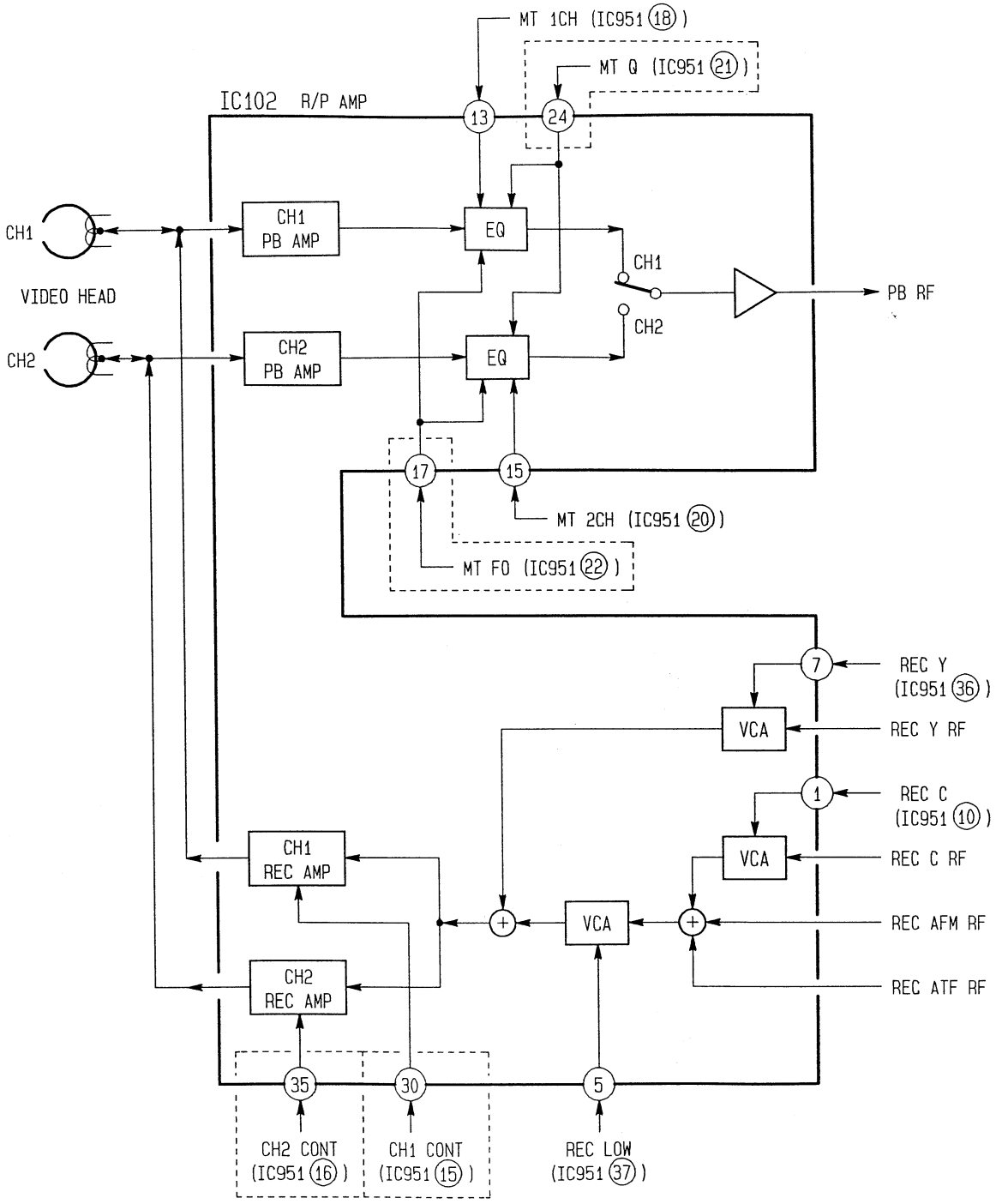
5-2. Video system

A. RF signal system

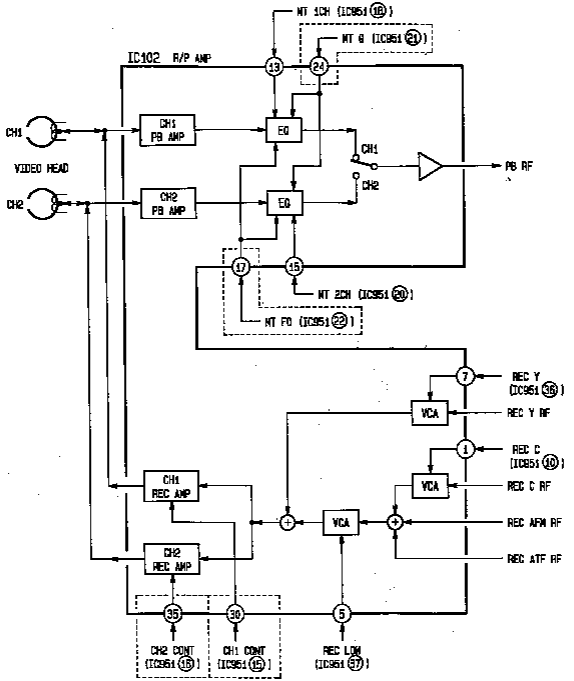


Adjusting voltage shown in [ ] is fixed and no adjustment is required.

Fig. 5-3

5-2. Video system

A. RF signal system



Adjusting voltage shown in [ ] is fixed and no adjustment is required.

Fig. 5-3

• Video system adjusting voltage is outputted from IC951.

IC951 Pin No.	Name	Function	Page D Address	Data	Voltage [V]	Adjusting voltage "LOW"	Adjusting voltage "HIGH"
10	REC C	Chroma signal REC current adjustment	30	E5	4.4	Remains unchanged.	Color is distorted on recorded picture and color S/N become poor.
18	MT 1CH	CH 1 PB frequency characteristic adjustment	5A	E1	4.2	Remains unchanged.	Remains unchanged.
20	MT 2CH	CH 2 PB frequency characteristic adjustment	5F	D7	4.1		
36	REC Y	Y signal REC current adjustment	44	BD	3.6	Short cycle noise appears on several points	Color is distorted over the entire picture and inversion noise appears.
37	REC LOW	CH 1 low frequency signal mix level adjustment (ME tape)	38	DF	4.3	Inversion noise appears on colored picture.	Color noise and distortion appear on the entire picture.
		CH 1 low frequency signal mix level adjustment (MP tape)	39	E9	4.5		
		CH 2 low frequency signal mix level adjustment (ME tape)	3A	DF	4.3		
		CH 2 low frequency signal mix level adjustment (MP tape)	3B	E9	4.5		

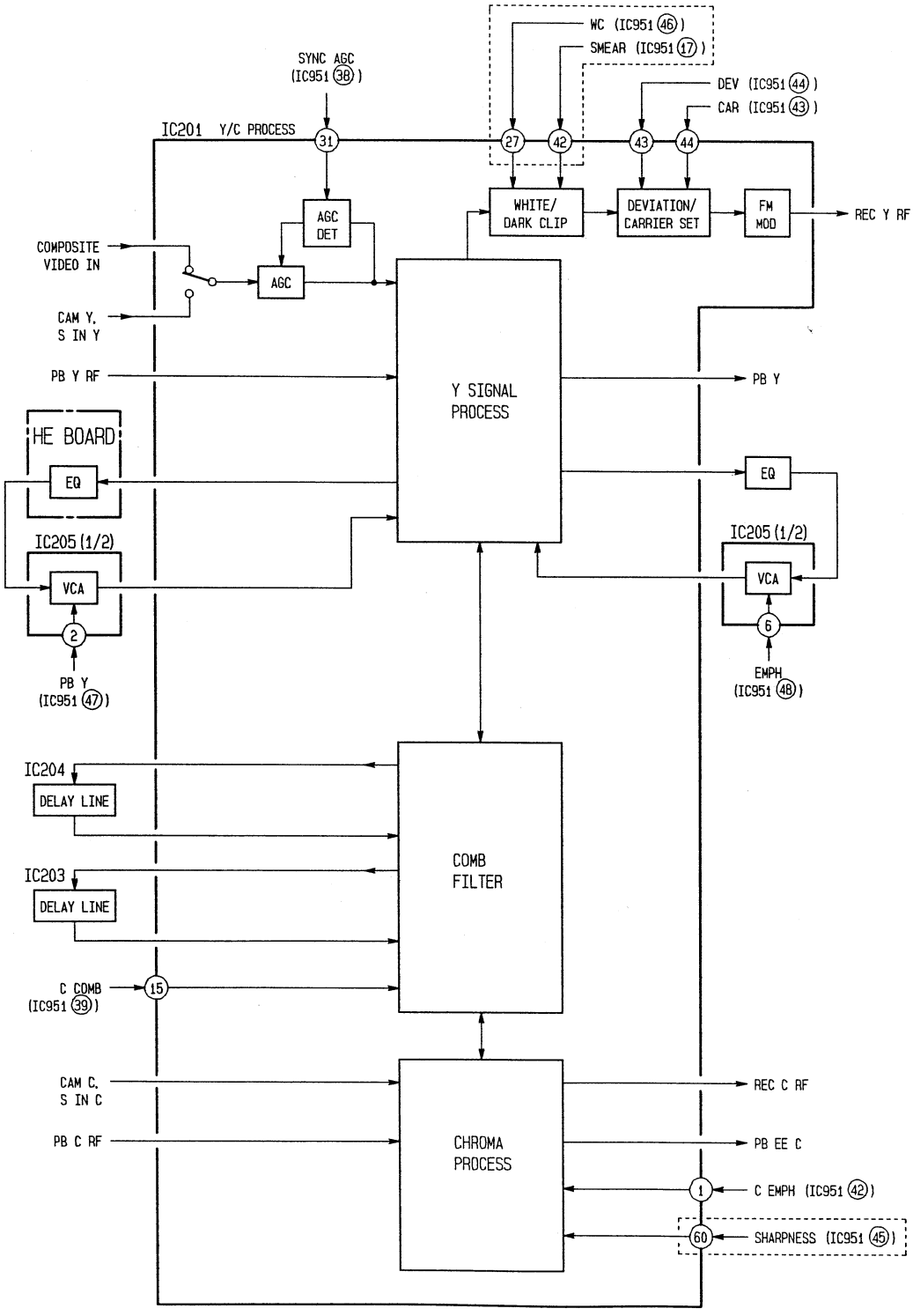
*** Voltages were measured at corresponding measuring points, and only the addresses for adjustment to specifications are shown.**
The state of REC adjusting voltage is shown after playback of recorded signal at high or low voltage.

• **Video system adjusting voltage is outputted from IC951.**

IC951 Pin No.	Name	Function	Page D Address	Data	Voltage [V]	Adjusting voltage "LOW"	Adjusting voltage "HIGH"
10	REC C	Chroma signal REC current adjustment	3B	E5	4.4	Remains unchanged.	Color is distorted on recorded picture and color S/N becomes poor.
18	MT 1CH	CH 1 PB frequency characteristic adjustment	5A	E1	4.2	Remains unchanged.	Remains unchanged.
20	MT 2CH	CH 2 PB frequency characteristic adjustment	5F	D7	4.1		
36	REC Y	Y signal REC current adjustment	44	BD	3.6	Short cycle noise appears on several points	Color is distorted over the entire picture and inversion noise appears.
37	REC LOW	CH 1 low frequency signal mix level adjustment (MB tape)	38	DF	4.3	Inversion noise appears on colored picture.	Color noise and distortion appear on the entire picture.
		CH 1 low frequency signal mix level adjustment (MP tape)	39	E9	4.5		
		CH 2 low frequency signal mix level adjustment (ME tape)	3A	DF	4.3		
		CH 2 low frequency signal mix level adjustment (MP tape)	3B	E9	4.5		

* **Voltages were measured at corresponding measuring points, and only the addresses for adjustment to specifications are shown.**
The state of REC adjusting voltage is shown after playback of recorded signal at high or low voltage.

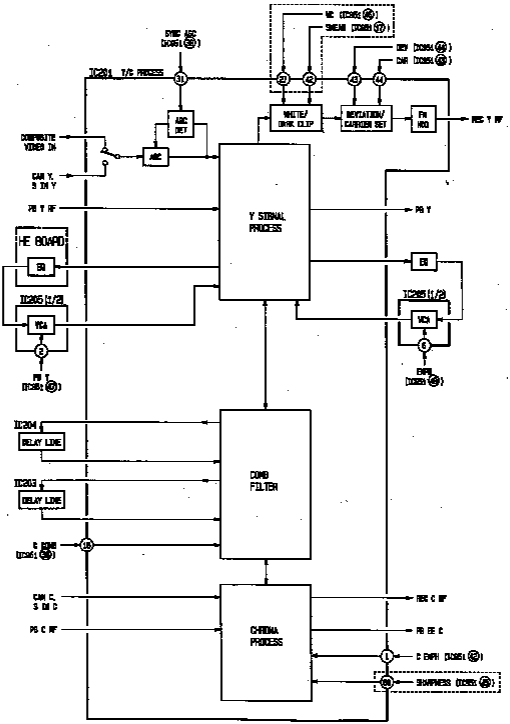
B. Video signal system



Adjusting voltage shown in [ ] is fixed and no adjustment is required.

Fig. 5-4

B. Video signal system



Adjusting voltage shown in [ ] is fixed and no adjustment is required.

Fig. 5-4

• Video system adjusting voltage is outputted from IC951.

IC951 Pin No.	Name	Function	Page D Address	Data	Voltage [V]	Adjusting voltage "LOW"	Adjusting voltage "HIGH"
38	SYNC AGC	SYNC AGC level adjustment	70	78	2.3	Remains unchanged.	Picture is dark. No picture appears when voltage is very high.
39	C COMB	Comb filter adjustment	71	99	2.9	REC: Color distortion on colored picture	
						PB: Dark color	PB: Remains unchanged.
42	C EMPH	Chroma emphasis adjustment (EE)	80	9A	3.0	Remains unchanged.	Remains unchanged.
		Chroma emphasis adjustment (PB)	81	9A	3.0	Remains unchanged.	Slight change in color
43	CAR	Hi8 mode Y FM carrier frequency adjustment	74	CE	4.0	Color distortion appears.	Inversion noise appears.
		Normal mode Y FM carrier frequency adjustment	75	C0	3.7	White/black picture appears, and picture is distorted.	Inversion noise appears.
44	DEV	Hi8 mode Y FM deviation adjustment	76	A8	3.2	Picture becomes dark.	Slight inversion noise appears.
		Normal mode Y FM deviation adjustment	77	97	2.9	Picture becomes dark.	Inversion noise appears.
47	PB Y	Hi8 mode deemphasis level adjustment	86	AF	3.4	Picture becomes dark. No picture appears when voltage is very low.	Picture becomes bright.
		Normal mode deemphasis level adjustment	87	A2	3.15		
48	EMPH	EE mode emphasis input level adjustment	82	A8	3.2	Picture becomes dark. No picture appears when voltage is very low.	Picture becomes bright.
		PB mode Y output level adjustment	83	8F	2.7		

• Video system adjusting voltage is outputted from IC951.

IC951 Pin No.	Name	Function	Page:D Address	Data	Voltage [V]	Adjusting voltage "LOW"	Adjusting voltage "HIGH"
38	SYNC AGC	SYNC AGC level adjustment	70	78	2.3	Remains unchanged.	Picture is dark. No picture appears when voltage is very high.
39	C COMB	Comb filter adjustment	71	99	2.9	REC: Color distortion on colored picture	
						PB: Dark color	PB: Remains unchanged.
42	C EMPH	Chroma emphasis adjustment (EE)	80	9A	3.0	Remains unchanged.	Remains unchanged.
		Chroma emphasis adjustment (PB)	81	9A	3.0	Remains unchanged.	Slight change in color
43	CAR	HI8 mode Y FM carrier frequency adjustment	74	CE	4.0	Color distortion appears.	Inversion noise appears.
		Normal mode Y FM carrier frequency adjustment	75	C0	3.7	White/black picture appears, and picture is distorted.	Inversion noise appears.
44	DEV	HI8 mode Y FM deviation adjustment	76	A8	3.2	Picture becomes dark.	Slight inversion noise appears.
		Normal mode Y FM deviation adjustment	77	97	2.9	Picture becomes dark.	Inversion noise appears.
47	PB Y	HI8 mode deemphasis level adjustment	86	AF	3.4	Picture becomes dark. No picture appears when voltage is very low.	Picture becomes bright.
		Normal mode deemphasis level adjustment	87	A2	3.15		
48	EMPH	EE mode emphasis input level adjustment	82	A8	3.2	Picture becomes dark. No picture appears when voltage is very low.	Picture becomes bright.
		PB mode Y output level adjustment	83	8F	2.7		

6. Operation at fault detection

The following explains the operation in each mode when each motors are not rotated or when rotation detect signal and other detect signals are lost.

① REEL FG signal is not outputted due to trouble with REEL FG sensor or REEL FG amplifier.

Mode	Operation after fault detection	Emergency mode	Emergency code
LOADING	Not detected		
UNLOADING	Set in emergency mode after the start of unloading operation for emergency loading.	31	02
REC/PB	Set in emergency mode about 3 seconds later.	04/06	03
FF/REW	Set in emergency mode immediately.	03/83	03

- When VTR is set in emergency mode, all the switches other than EJECT SWITCH and POWER SWITCH cannot be used.

② Drum motor is not rotated.

Mode	Operation after fault detection	Emergency mode	Emergency code
LOADING	Set in EJECT mode about 6 seconds after CC DOWN SWITCH ON.	12	05
UNLOADING	Set in emergency UNLOADING about 6 seconds after EJECT SWITCH ON.	31	05
REC/PB	Set in emergency mode immediately.	04/06	07
FF/REW	Set in emergency mode immediately.	03/83	07

- When VTR is set in emergency mode while tape is running, REC/PB, FF/REW, etc., all the switches other than EJECT SWITCH and POWER SWITCH cannot be used. In this case, EJECT operation is effected by emergency unloading.

[Emergency unloading]

Tape is slightly taken up by T reel and then wound on S reel for unloading. At this time, the drum motor is not rotated.

In the emergency unloading, the loading motor is driven step by step.

6. Operation at fault detection

The following explains the operation in each mode when each motors are not rotated or when rotation detect signal and other detect signals are lost.

① REEL FG signal is not outputted due to trouble with REEL FG sensor or REEL FG amplifier.

Mode	Operation after fault detection	Emergency mode	Emergency code
LOADING	Not detected		
UNLOADING	Set in emergency mode after the start of unloading operation for emergency loading.	31	02
REC/PB	Set in emergency mode about 3 seconds later.	04/06	03
FF/REW	Set in emergency mode immediately.	03/83	03

- When VTR is set in emergency mode, all the switches other than EJECT SWITCH and POWER SWITCH cannot be used.

② Drum motor is not rotated.

Mode	Operation after fault detection	Emergency mode	Emergency code
LOADING	Set in EJECT mode about 6 seconds after CC DOWN SWITCH ON.	12	05
UNLOADING	Set in emergency UNLOADING about 6 seconds after EJECT SWITCH ON.	31	05
REC/PB	Set in emergency mode immediately.	04/06	07
FF/REW	Set in emergency mode immediately.	03/83	07

- When VTR is set in emergency mode while tape is running, REC/PB, FF/REW, etc., all the switches other than EJECT SWITCH and POWER SWITCH cannot be used. In this case, EJECT operation is effected by emergency unloading.

[Emergency unloading]

Tape is slightly taken up by T reel and then wound on S reel for unloading. At this time, the drum motor is not rotated.

In the emergency unloading, the loading motor is driven step by step.

③ No DRUM FG/PG output

- VTR runs away and is set in emergency mode when the drum motor is rotated from the stop position regardless of mode.

  The processing taken after emergency mode is the same as that for "**2 Drum motor is not rotated**".

  Emergency mode: 12 (LOADING) Emergency code: 05 or 07
  31 (UNLOADING)
  04 (REC)
  06 (PB)
  03 (FF)
  83 (REW)

④ Capstan motor is not rotated.

Mode	Operation after fault detection	Emergency mode	Emergency code
LOADING	Shifted to loading end position about 3 seconds after CC DOWN SWITCH ON. At this time, all the switches other than EJECT, POWER SWITCH cannot be used.	12	04
UNLOADING	Loading motor is rotated slightly and tape guide is shifted slightly in unload direction for emergency loading.	31	04
REC/PB	Set in emergency mode about 2 seconds later.	04/06	04
FF/REW	Set in emergency mode about 2 seconds later.	03/83	04

[Emergency loading]

When trouble arises, loading operation is effected to the normal loading end position. In this mode, all the switches other than POWER, EJECT SWITCH cannot be used.

At this time, EJECT operation is effected only once.

If this is not effected correctly, all the switches other than POWER SWITCH cannot be used.

⑤ No capstan FG output

- Capstan motor runs away (REC/PB, FF/REW) and VTR is set in emergency mode about 1 second later (during loading/unloading, only the emergency mode/code are written).
- In the emergency mode, all the switches other than EJECT, POWER SWITCH cannot be used.

Mode	Emergency mode	Emergency code
LOADING	12	04
UNLOADING	31	04
REC/PB	14/06	04
FF/REW	03/83	04

③ No DRUM FG/PG output

- VTR runs away and is set in emergency mode when the drum motor is rotated from the stop position regardless of mode.

  The processing taken after emergency mode is the same as that for "2 Drum motor is not rotated".

Emergency mode: 12 (LOADING) Emergency code: 05 or 07
31 (UNLOADING)
04 (REC)
06 (PB)
03 (FF)
83 (REW)

④ Capstan motor is not rotated.

Mode	Operation after fault detection	Emergency mode	Emergency code
LOADING	Shifted to loading end position about 3 seconds after CC DOWN SWITCH ON. At this time, all the switches other than EJECT, POWER SWITCH cannot be used.	12	04
UNLOADING	Loading motor is rotated slightly and tape guide is shifted slightly in unload direction for emergency loading.	31	04
REC/PB	Set in emergency mode about 2 seconds later.	04/06	04
FF/REW	Set in emergency mode about 2 seconds later.	03/83	04

[Emergency loading]

When trouble arises, loading operation is effected to the normal loading end position. In this mode, all the switches other than POWER, EJECT SWITCH cannot be used.

At this time, EJECT operation is effected only once.

If this is not effected correctly, all the switches other than POWER SWITCH cannot be used.

⑤ No capstan FG output

- Capstan motor runs away (REC/PB, FF/REW) and VTR is set in emergency mode about 1 second later (during loading/unloading, only the emergency mode/code are written).
- In the emergency mode, all the switches other than EJECT, POWER SWITCH cannot be used.

Mode	Emergency mode	Emergency code
LOADING	12	04
UNLOADING	31	04
REC/PB	14/06	04
FF/REW	03/83	04

⑥ Loading motor is not rotated.

Mode	Operation after fault detection	Emergency mode	Emergency code
USE→ LOADING	Set in emergency mode about 20 seconds later, and cassette compartment is locked.	12	01
READY→ UNLOADING	Set in emergency mode about 12 seconds later.	31	01
READY→ REC/PB	Set in emergency mode about 10 seconds later.	14/06	01
READY→ FF/REW	Set in emergency mode about 10 seconds later.	03/83	01

⑦ DEW

- All the switches other than POWER SWITCH and EJECT SWITCH cannot be used (this operation continues for about 1 hour at detection of DEW).
- Once it is ejected*, loading with cassette tape is impossible.
- At this time, tape stops if it is running.

***If cassette is ejected when DEW is detected, VTR is set in emergency eject mode.**

⑧ TAPE LED and TAPE TOP/END sensor are not operating.

(1) TAPE LED is not lit.

- Cassette compartment with cassette is always discriminated, and the functions switches (other than REC) of the tape drive system cannot be used even when cassette is not inserted.

- Cassette which has reached the tape end cannot be loaded.

  Emergency mode : 12

  Emergency code : 07

- Tape top/end cannot be detected and VTR is set in emergency mode at tape top/end.

  Emergency mode : 03 (FF), 04 (REC), 06 (PB), 46 (CUE), 56 (REV), 83 (REW) .....etc.

  Emergency code : 07, 03

  03 → Reel emergency

  07 → Drum motor stops rotating due to tape tension and VTR is set in emergency mode.

⑥ Loading motor is not rotated.

Mode	Operation after fault detection	Emergency mode	Emergency code
USE→ LOADING	Set in emergency mode about 20 seconds later, and cassette compartment is locked.	12	01
READY→ UNLOADING	Set in emergency mode about 12 seconds later.	31	01
READY→ REC/PB	Set in emergency mode about 10 seconds later.	14/06	01
READY→ FF/REW	Set in emergency mode about 10 seconds later.	03/83	01

⑦ DEW

- All the switches other than POWER SWITCH and EJECT SWITCH cannot be used (this operation continues for about 1 hour at detection of DEW).
- Once it is ejected*, loading with cassette tape is impossible.
- At this time, tape stops if it is running.

*If cassette is ejected when DEW is detected, VTR is set in emergency eject mode.

⑧ TAPE LED and TAPE TOP/END sensor are not operating.

(1) TAPE LED is not lit.

- Cassette compartment with cassette is always discriminated, and the functions switches (other than REC) of the tape drive system cannot be used even when cassette is not inserted.

- Cassette which has reached the tape end cannot be loaded.
  Emergency mode : 12
  Emergency code : 07

- Tape top/end cannot be detected and VTR is set in emergency mode at tape top/end.
  Emergency mode : 03 (FF), 04 (REC), 06 (PB), 46 (CUE), 56 (REV), 83 (REW).....etc.
  Emergency code : 07, 03
  - 03 → Reel emergency
  - 07 → Drum motor stops rotating due to tape tension and VTR is set in emergency mode.

(2) TAPE TOP SENSOR is not operating.

- When cassette is not inserted into cassette compartment, it is erroneously discriminated that a tape end cassette is inserted into the cassette compartment. Therefore, cassette compartment opens immediately after closing it, so loading operation is not effected unless it is closed again (for shifting to END mode).
- Since it is discriminated that a tape end cassette is inserted, REWIND SWITCH is operated when cassette is not inserted.
- When cassette is inserted, tape top cannot be detected so VTR is set in emergency mode at the tape top.

  Emergency mode : 56 (REVIEW), 83 (REWIND), B5 (EDIT SEARCH-)

  Emergency code : 03

(3) TAPE END SENSOR is not operating.

- When cassette is not inserted into cassette compartment, it is erroneously discriminated that a tape top cassette is inserted. Therefore, PLAY, FF SWITCH are operated when cassette is not inserted.
- Cassette which has reached tape end cannot be loaded.

  Emergency mode : 12

  Emergency code : 07

- When cassette is inserted, tape end cannot be detected so VTR is set in emergency mode at tape end.

  Emergency mode : 03 (FF), 04 (REC), 06 (PB), 46 (CUE), A5 (EDIT SEARCH+)

  Emergency code : 07

  ↳ Drum motor stops rotating due to tape tension and VTR is set in emergency mode.

(2) TAPE TOP SENSOR is not operating.

- When cassette is not inserted into cassette compartment, it is erroneously discriminated that a tape end cassette is inserted into the cassette compartment. Therefore, cassette compartment opens immediately after closing it, so loading operation is not effected unless it is closed again (for shifting to END mode).
- Since it is discriminated that a tape end cassette is inserted, REWIND SWITCH is operated when cassette is not inserted.
- When cassette is inserted, tape top cannot be detected so VTR is set in emergency mode at the tape top.

  Emergency mode : 56 (REVIEW), 83 (REWIND), B5 (EDIT SEARCH-)

  Emergency code : 03

(3) TAPE END SENSOR is not operating.

- When cassette is not inserted into cassette compartment, it is erroneously discriminated that a tape top cassette is inserted. Therefore, PLAY, FF SWITCH are operated when cassette is not inserted.
- Cassette which has reached tape end cannot be loaded.

  Emergency mode : 12

  Emergency code : 07

- When cassette is inserted, tape end cannot be detected so VTR is set in emergency mode at tape end.

  Emergency mode : 03 (FF), 04 (REC), 06 (PB), 46 (CUE), A5 (EDIT SEARCH+)

  Emergency code : 07

  ↳ Drum motor stops rotating due to tape tension and VTR is set in emergency mode.

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